Supplementary Online Content

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This supplementary material has been provided by the authors to give readers additional information about their work.

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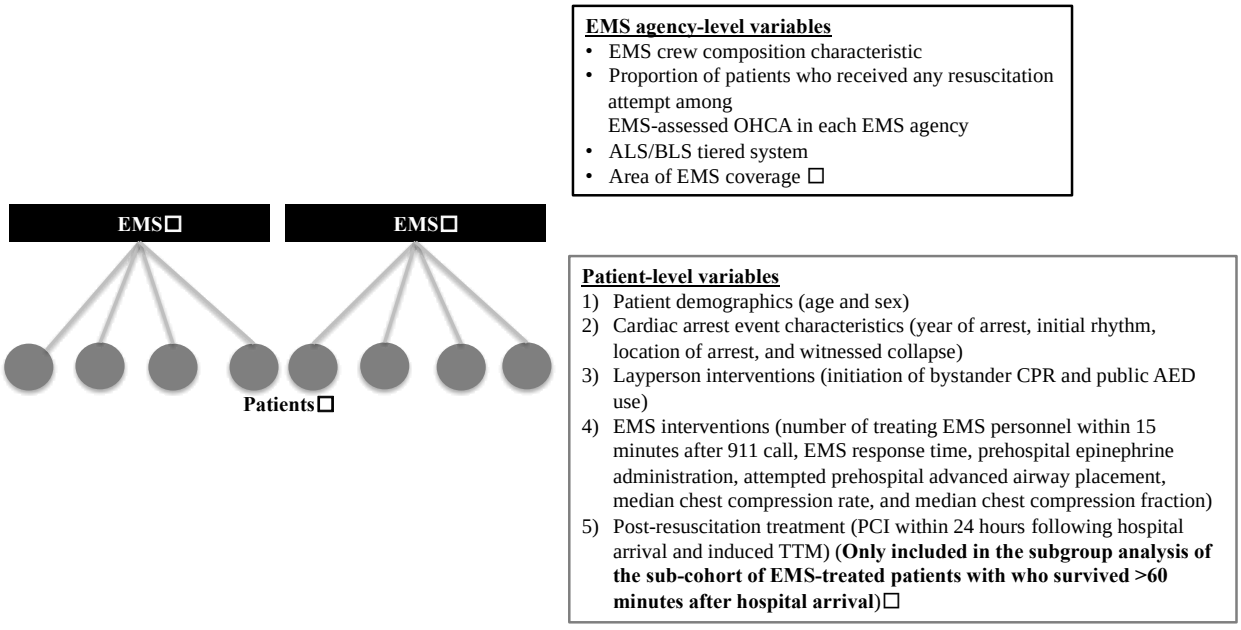
Supplemental Figure 1☐



eFigure 1. Multivariable Hierarchical Model with Patient- and EMS Agency-level Covariates

EMS indicates emergency medical services; OHCA, out-of-hospital cardiac arrest; ALS, advanced life support; BLS, basic life support; CPR, cardiopulmonary resuscitation; AED, automated external defibrillator; PCI, percutaneous coronary intervention; TTM, targeted temperature management.

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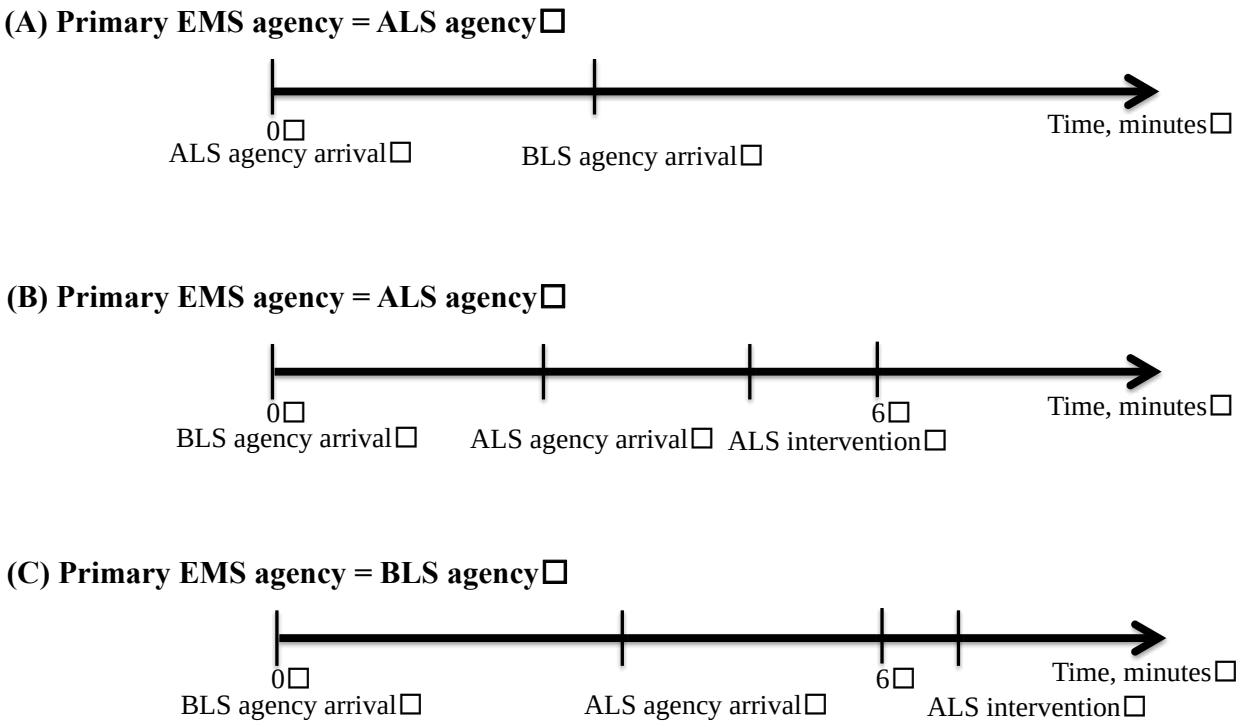
Supplemental Figure 2☐



eFigure 2. Assignment of the Primary EMS Agency under Multiple Agencies Involvement

(A) the ALS agency was the primary agency if the ALS agency arrived at the scene earlier than the BLS agency, (B) the ALS agency was the primary agency if the BLS agency arrived at the scene earlier than ALS agency but an ALS intervention(s) was provided within 6 minutes of BLS agency arrival, and (C) the BLS agency was the primary agency if the BLS agency arrived at the scene earlier than the ALS agency and no ALS intervention was provided within 6 minutes from BLS agency arrival. We defined ALS interventions as the delivery of an advanced airway (endotracheal tube or supraglottic airway), manual defibrillation, or intravenous drug therapy. EMS indicates emergency medical services; ALS, advanced life support; and BLS, basic life support.

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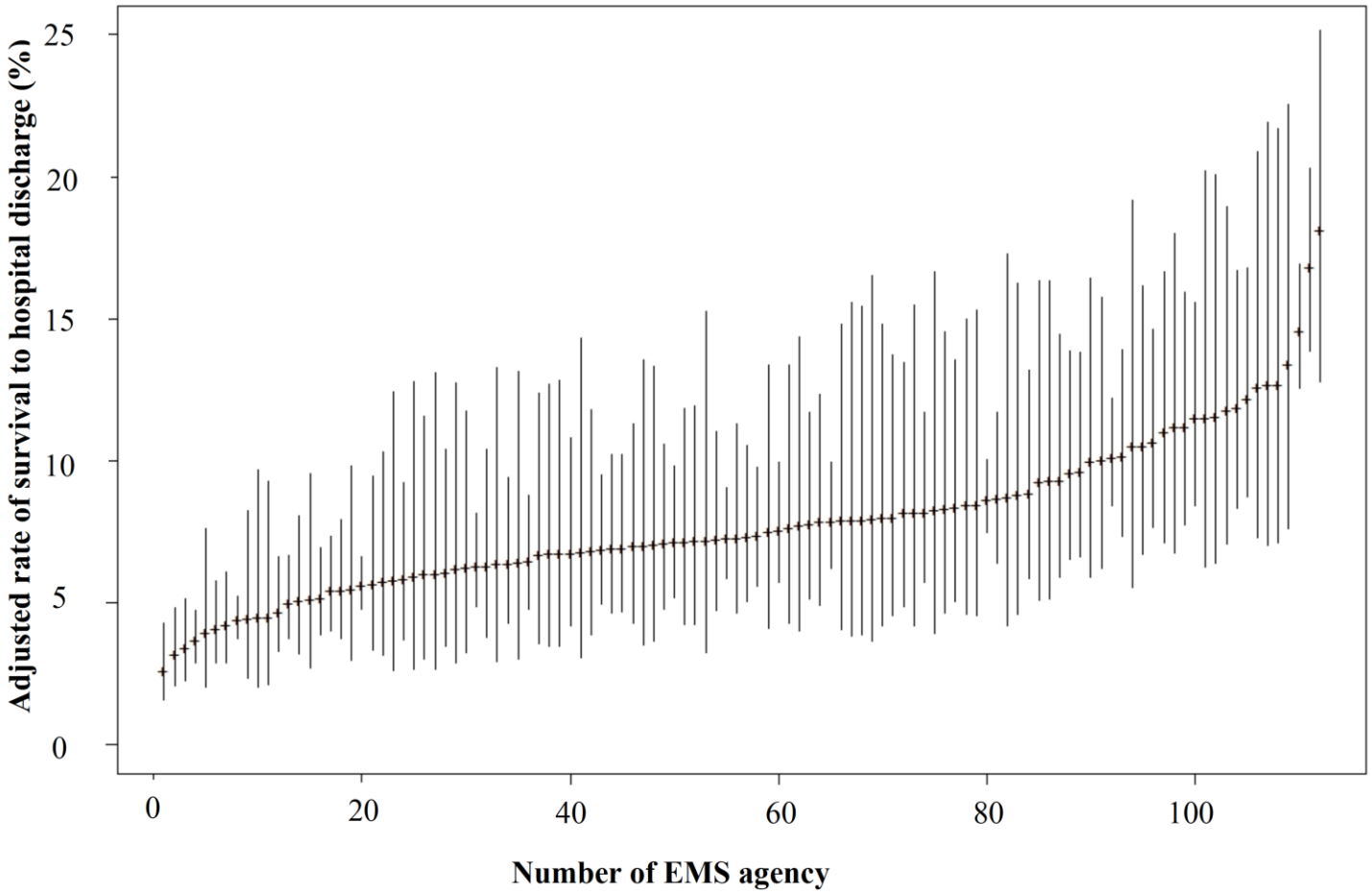
Supplemental Figure 3



eFigure 3. Variation in Adjusted Rate of Survival to Hospital Discharge with 95% CI between EMS Agencies[a]

[a] Adjusted for patient demographics, cardiac arrest event characteristics, layperson interventions, EMS interventions, and EMS agency-level variables.

EMS indicates emergency medical services; and CI, confidence interval.

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eTable 1. Patient, Cardiac Arrest Event, Layperson and EMS Interventions, Post-resuscitation Management, and EMS Agency Characteristics among Those who Survived >60 minutes after Hospital Arrival, Stratified by Quartiles of Survival at EMS agency

	Total	Quartile 1	Quartile 2	Quartile 3	Quartile 4
Rate of survival to hospital discharge		0% to 8.46%	8.47% to 12.54%	12.55% to 15.84%	15.85% to 28.95%
Number of patients	10,561	2,389	4,172	1,777	2,223
Patient demographics					
Age					
Median (IQR)	64.0 (53.0, 76.0)	64.0 (54.0, 76.0)	65.0 (54.0, 77.0)	64.0 (53.0, 76.0)	63.0 (52.0, 75.0)
Sex, n(%)					
Male	6,686 (63.3%)	1,402 (58.7%)	2,646 (63.4%)	1,181 (66.5%)	1,457 (65.5%)
Unknown	3 (0.0%)	0 (0.0%)	1 (0.0%)	2 (0.1%)	0 (0.0%)
Cardiac arrest event characteristics					
Year of arrest, n (%)					
2011	1,517 (14.4%)	338 (14.1%)	634 (15.2%)	227 (12.8%)	318 (14.3%)
2012	3,459 (32.8%)	715 (29.9%)	1,368 (32.8%)	589 (33.1%)	787 (35.4%)
2013	2,211 (20.9%)	507 (21.2%)	894 (21.4%)	391 (22.0%)	419 (18.8%)
2014	2,412 (22.8%)	589 (24.7%)	913 (21.9%)	399 (22.5%)	511 (23.0%)
2015	962 (9.1%)	240 (10.0%)	363 (8.7%)	171 (9.6%)	188 (8.5%)
Initial rhythm, n (%)					
Shockable	4,395 (41.6%)	873 (36.5%)	1,688 (40.5%)	813 (45.8%)	1,021 (45.9%)
Non-shockable	5,905 (55.9%)	1,467 (61.4%)	2,390 (57.3%)	909 (51.2%)	1,139 (51.2%)
Unknown	261 (2.5%)	49 (2.1%)	94 (2.2%)	55 (3.1%)	63 (2.9%)
Location, n (%)					
Public	2,314 (21.9%)	484 (20.3%)	912 (21.9%)	426 (24.0%)	492 (22.1%)
Home	7,231 (68.5%)	1,563 (65.4%)	2,958 (70.9%)	1,212 (68.2%)	1,498 (67.4%)
Other	988 (9.4%)	333 (13.9%)	288 (6.9%)	135 (7.6%)	232 (10.4%)
Unknown	28 (0.3%)	9 (0.4%)	14 (0.3%)	4 (0.2%)	1 (0.0%)
Witnessed collapse, n (%)					
Bystander, n (%)	5,687 (53.8%)	1,183 (49.5%)	2,232 (53.5%)	1,056 (59.4%)	1,216 (54.7%)
EMS, n (%)	958 (9.1%)	238 (10.0%)	365 (8.7%)	148 (8.3%)	207 (9.3%)
None, n (%)	3,678 (34.8%)	892 (37.3%)	1,460 (35.0%)	540 (30.4%)	786 (35.4%)

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Unknown, n (%)	238 (2.3%)	76 (3.2%)	115 (2.8%)	33 (1.9%)	14 (0.6%)
	Total	**Quartile 1**	**Quartile 2**	**Quartile 3**	**Quartile 4**
Layperson interventions, n (%)					
None	5,372 (50.9%)	1,420 (59.4%)	2,231 (53.5%)	867 (48.8%)	854 (38.4%)
Layperson CPR Only	4,480 (42.4%)	817 (34.2%)	1,692 (40.6%)	784 (44.1%)	1,187 (53.4%)
Layperson CPR and public access AED use	535 (5.1%)	120 (5.0%)	175 (4.2%)	85 (4.8%)	155 (7.0%)
Unknown	174 (1.6%)	32 (1.3%)	74 (1.8%)	41 (2.3%)	27 (1.2%)
EMS interventions					
Number of treating EMS personnel within 15 minutes after 9-1-1 call, n (%)					
Mean (SD)	5.9 (2.1)	5.5 (1.6)	5.6 (2.0)	5.7 (2.1)	7.0 (2.1)
≤6	6,907 (65.4%)	2,012 (84.2%)	2,957 (70.9%)	1,148 (64.6%)	790 (35.5%)
>6	3,646 (34.5%)	370 (15.5%)	1,214 (29.1%)	629 (35.4%)	1,433 (64.5%)
Unknown	8 (0.1%)	7 (0.3%)	1 (0.0%)	0 (0.0%)	0 (0.0%)
EMS response time (time interval from dispatch to 1st EMS arrival)					
Median (IQR), minutes	5.3 (4.1, 6.8)	5.0 (3.8, 6.3)	5.4 (4.1, 7.0)	5.7 (4.5, 7.0)	5.2 (4.1, 6.5)
Unknown, n (%)	104 (1.0%)	54 (2.3%)	45 (1.1%)	4 (0.2%)	1 (0.0%)
Time interval from first 9-1-1 call to defibrillation					
Median (IQR), minutes	10.2 (8.1, 14.1)	10.6 (8.3, 15.2)	10.3 (8.1, 13.8)	10.6 (8.5, 14.3)	9.7 (7.8, 13.4)
Unknown, n (%)	5,296 (50.1%)	1,354 (56.7%)	2,101 (50.4%)	830 (46.7%)	1,011 (45.5%)
Epinephrine administration, n (%)					
Yes	8,264 (78.3%)	1,956 (81.9%)	3,339 (80.0%)	1,300 (73.2%)	1,669 (75.1%)
No	2,290 (21.7%)	431 (18.0%)	828 (19.8%)	477 (26.8%)	554 (24.9%)
Unknown	7 (0.1%)	2 (0.1%)	5 (0.1%)	0 (0.0%)	0 (0.0%)
Attempted advanced airway, n (%)					
Yes	8,611 (81.5%)	1,871 (78.3%)	3,307 (79.3%)	1,420 (79.9%)	2,013 (90.6%)
No	1,940 (18.4%)	513 (21.5%)	860 (20.6%)	357 (20.1%)	210 (9.4%)
Unknown	10 (0.1%)	5 (0.2%)	5 (0.1%)	0 (0.0%)	0 (0.0%)
Chest compression fraction					

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	Total	Quartile 1	Quartile 2	Quartile 3	Quartile 4
Median (IQR)	0.83 (0.74, 0.90)	0.81 (0.72, 0.88)	0.82 (0.73, 0.89)	0.84 (0.75, 0.90)	0.88 (0.80, 0.93)
Unknown, n (%)	1,843 (17.5%)	429 (18.0%)	723 (17.3%)	346 (19.5%)	345 (15.5%)
Compression rate					
Median (IQR), per minute	109.0 (102.4, 117.1)	108.7 (101.6, 118.2)	108.7 (102.4, 116.6)	109.6 (102.8, 117.8)	109.6 (103.5, 116.2)
Unknown, n (%)	1,960 (18.6%)	405 (17.0%)	738 (17.7%)	344 (19.4%)	473 (21.3%)
Post-resuscitation management					
PCI within 24 hours following hospital arrival, n (%)	1,582 (15.0%)	296 (12.4%)	623 (14.9%)	293 (16.5%)	370 (16.6%)
TTM, n (%)	5,344 (50.6%)	1,062 (44.5%)	2,172 (52.1%)	932 (52.4%)	1,178 (53.0%)
EMS agency characteristics					
Crew composition of primary EMS agency, n (%)					
BLS	2,821 (26.7%)	639 (26.7%)	624 (15.0%)	946 (53.2%)	612 (27.5%)
ALS	183 (1.7%)	7 (0.3%)	0 (0.0%)	70 (3.9%)	106 (4.8%)
BLS/ALS	7,557 (71.6%)	1,743 (73.0%)	3,548 (85.0%)	761 (42.8%)	1,505 (67.7%)
Proportion of patients who received resuscitation attempt among EMS-assessed OHCA in each EMS agency, % (SD)	53.0% (15.6%)	57.7% (18.7%)	49.3% (11.7%)	59.2% (17.1%)	49.7% (14.1%)
BLS/ALS tiered response system, n (%)	6,906 (65.4%)	852 (35.7%)	2,959 (70.9%)	1,229 (69.2%)	1,866 (83.9%)
Area of EMS agency coverage, n (%)					
Rural	491 (4.6%)	186 (7.8%)	25 (0.6%)	142 (8.0%)	138 (6.2%)
Suburban	2,150 (20.4%)	42 (1.8%)	716 (17.2%)	697 (39.2%)	695 (31.3%)
Urban	7,920 (75.0%)	2,161 (90.5%)	3,431 (82.2%)	938 (52.8%)	1,390 (62.5%)

Abbreviation; EMS, emergency medical services, IQR, interquartile range; CPR, cardiopulmonary resuscitation; BLS, basic life support; ALS, advanced life support; SD, standard deviation; TTM, targeted temperature management; PCI, percutaneous coronary intervention.

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eTable 2: **Patient Demographics, Cardiac Arrest Event Characteristics, Layperson and EMS Interventions, EMS Agency Characteristics, and Outcome between Cases with and without Missing Variables**

	Total	Cases without missing variables	Cases with missing variables	SMD
Number of patients	43,656	32,533	11,123	
Patient demographics				
Age				
Median (IQR)	66.0 (54.0, 79.0)	67.0 (55.0, 79.0)	66.0 (54.0, 79.0)	0.034
Sex, n (%)				
Male	27,524 (63.0%)	20,770 (63.8%)	6,754 (60.7%)	0.064
Unknown	18 (0.0%)	0 (0.0%)	18 (0.2%)	
Cardiac arrest event characteristics				
Year of arrest, n (%)				
2011	4,508 (10.3%)	2,951 (9.1%)	1,557 (14.0%)	0.155
2012	10,118 (23.2%)	7,514 (23.1%)	2,604 (23.4%)	0.007
2013	11,242 (25.8%)	8,554 (26.3%)	2,688 (24.2%)	0.049
2014	11,903 (27.3%)	9,095 (28.0%)	2,808 (25.2%)	0.061
2015	5,885 (13.5%)	4,419 (13.6%)	1,466 (13.2%)	0.012
Initial rhythm, n (%)				
Shockable	9,717 (22.3%)	7,602 (23.4%)	2,115 (19.0%)	0.107
Non-shockable	33,084 (75.8%)	24,931 (76.6%)	8,153 (73.3%)	0.077
Unknown	855 (1.9%)	0 (0.0%)	855 (7.7%)	
Location, n (%)				
Public	6,235 (14.3%)	4,692 (14.4%)	1,543 (13.9%)	0.016
Home	31,846 (72.9%)	23,931 (73.6%)	7,915 (71.2%)	0.054
Other	5,475 (12.5%)	3,910 (12.0%)	1,565 (14.1%)	0.061
Unknown	100 (0.2%)	0 (0.0%)	100 (0.9%)	
Witnessed collapse, n (%)				
Bystander	15,949 (36.5%)	12,563 (38.6%)	3,386 (30.4%)	0.173
EMS	5,398 (12.4%)	3,243 (10.0%)	2,155 (19.4%)	0.268
None	21,270 (48.7%)	16,727 (51.4%)	4,543 (40.8%)	0.213
Unknown	1,039 (2.4%)	0 (0.0%)	1,039 (9.3%)	

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Layperson interventions, n (%)				
	Total	**Cases without missing variables**	**Cases with missing variables**	**SMD**
None	24,042 (55.1%)	17,770 (54.6%)	6,272 (56.4%)	0.036
Layperson CPR only	16,831 (38.6%)	13,491 (41.5%)	3,340 (30.0%)	0.240
Layperson CPR and public access AED use	1,931 (4.4%)	1,272 (3.9%)	659 (5.9%)	0.093
Unknown	852 (2.0%)	0 (0.0%)	852 (7.7%)	
EMS interventions				
Number of treating EMS personnel within 15 minutes after 9-1-1 call, n (%)				
Mean (SD)	5.6 (2.1)	5.7 (2.1)	5.4 (2.1)	0.159
≤6	31,068 (71.2%)	22,683 (69.7%)	8,385 (75.4%)	0.127
>6	12,511 (28.7%)	9,850 (30.3%)	2,661 (23.9%)	0.143
Unknown	77 (0.2%)	0 (0.0%)	77 (0.7%)	
EMS response time (time interval from 9-1-1 call to 1st EMS arrival)				
Median (IQR), minutes	5.4 (4.2, 6.9)	5.4 (4.2, 6.9)	5.4 (4.1, 7.0)	0.023
Unknown, n (%)	521 (1.2%)	0 (0.0%)	521 (4.7%)	
Epinephrine administration, n (%)				
Yes	36,907 (84.5%)	28,398 (87.3%)	8,509 (76.5%)	0.283
No	6,715 (15.4%)	4,135 (12.7%)	2,580 (23.2%)	0.276
Unknown	34 (0.1%)	0 (0.0%)	34 (0.3%)	
Attempted advanced airway, n (%)				
Yes	34,392 (78.8%)	26,137 (80.3%)	8,255 (74.2%)	0.147
No	9,222 (21.1%)	6,396 (19.7%)	2,826 (25.4%)	0.138
Unknown	42 (0.1%)	0 (0.0%)	42 (0.4%)	
Chest compression fraction				
Median (IQR)	0.85 (0.77, 0.91)	0.85 (0.77, 0.91)	0.86 (0.75, 0.93)	0.051
Unknown, n (%)	8,212 (18.8%)	0 (0.0%)	8,212 (73.8%)	
Compression Rate				
Median (IQR), per minute	108.5 (102.1, 116.4)	108.4 (102.0, 116.2)	110.0 (103.0, 118.7)	0.130

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Unknown, n (%)	8,387 (19.2%)	0 (0.0%)	8,387 (75.4%)	
EMS agency characteristics				
	Total	**Cases without missing variables**	**Cases with missing variables**	**SMD**
Crew composition of primary EMS agency, n (%)				
BLS	9,848 (22.6%)	8,217 (25.3%)	1,631 (14.7%)	0.267
ALS	949 (2.2%)	460 (1.4%)	489 (4.4%)	0.178
BLS/ALS	32,859 (75.3%)	23,856 (73.3%)	9,003 (80.9%)	0.182
Proportion of patients who received resuscitation attempt among EMS-assessed OHCA in each EMS agency, % (SD)	54.0% (15.5%)	54.4% (15.8%)	53.0% (14.8%)	0.091
BLS/ALS tiered response system, n (%)	25,642 (58.7%)	20,285 (62.4%)	5,357 (48.2%)	0.288
Area of EMS agency coverage, n (%)				
Rural	1,835 (4.2%)	1,283 (3.9%)	552 (5.0%)	0.049
Suburban	8,329 (19.1%)	6,008 (18.5%)	2,321 (20.9%)	0.060
Urban	33,492 (76.7%)	25,242 (77.6%)	8,250 (74.2%)	0.080
Primary outcome				
Survival to hospital discharge, n (%)	4,912 (11.3%)	3,303 (10.2%)	1,609 (14.5%)	0.132

Abbreviation; SMD, standardized mean difference EMS, emergency medical services; IQR, interquartile range; CPR, cardiopulmonary resuscitation; BLS, basic life support; ALS, advanced life support; SD, standard deviation.

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eTable 3. Coefficient in the Multivariable Hierarchical Model with Patient-level and EMS Agency-level Variables

	Coefficient (95% CI)
Patient demographics	
Age, per 1 additional year	0.97 (0.97, 0.98)
Sex	
Male	1.01 (0.91, 1.11)
Female	reference
Cardiac arrest event characteristics	
Year of arrest	
2011	reference
2012	1.02 (0.86, 1.22)
2013	1.09 (0.92, 1.30)
2014	1.12 (0.94, 1.33)
2015	1.11 (0.91, 1.34)
Initial rhythm	
Shockable	17.9 (15.4, 20.8)
PEA	4.40 (3.74, 5.18)
Asystole	reference
Non-shockable, rhythm undetermined	2.88 (2.15, 3.86)
Location	
Public	reference
Home	0.70 (0.63, 0.78)
Other	0.59 (0.49, 0.71)
Witnessed Collapse	
Bystander	2.14 (1.92, 2.38)
EMS	2.72 (2.32, 3.18)
None	reference
Layperson Interventions	
None	reference
Layperson CPR only	1.19 (1.08, 1.32)
Layperson CPR and public access AED use	1.28 (1.02, 1.61)
EMS Interventions	

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Number of treating EMS personnel within 15 minutes after 9-1-1 call, n (%)	
	Coefficient (95% CI)
≤6	reference
>6	1.21 (1.08, 1.35)
EMS response time, per 1 additional minute	0.75 (0.68, 0.83)
Epinephrine administration	
No	reference
Yes	0.12 (0.11, 0.14)
Attempted advanced airway	
No	reference
Yes	0.63 (0.56, 0.71)
Chest compression fraction	
≥0.8	0.93 (0.84, 1.02)
<0.8	reference
Chest compression rate	
<100	reference
100-120	0.98 (0.86, 1.12)
>120	0.96 (0.82, 1.13)
EMS agency characteristics	
Crew composition of primary EMS agency	
BLS	reference
ALS	1.09 (0.55, 2.13)
BLS+ALS	0.87 (0.65, 1.18)
Proportion of patients who received resuscitation attempt among EMS-assessed OHCA in each EMS agency	0.83 (0.42, 1.68)
BLS/ALS tiered response system	
No	reference
Yes	0.91 (0.67, 1.24)
Area of EMS agency coverage	
Rural	reference
Suburban	1.12 (0.71, 1.77)
Urban	1.09 (0.71, 1.66)

Abbreviation; EMS, emergency medical services; PEA, pulseless electorical activity; CPR, cardiopulmonary resuscitation; AED, automated external defibrillator; BLS,

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basic life support; ALS, advanced life support; OHCA, out-of-hospital cardiac arrest; CI, confidence interval

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eTable 4. Variation in Survival and Functional Outcomes between EMS Agencies, including Compression Depth

	EMS-treated OHCA				EMS-treated shockable OHCA				EMS-treated non-shockable OHCA		
	Survival to hospital discharge	**Favorable functional outcome**	**ROSC at ED arrival**		**Survival to hospital discharge**	**Favorable functional outcome**	**ROSC at ED arrival**		**Survival to hospital discharge**	**Favorable functional outcome**	**ROSC at ED arrival**
	n=17,789	n=10,096	n=17,787		n=4,046	n=2,368	n=4,044		n=13,743	n=7,454	n=13,743
	Median OR for EMS agency effect (95% CI)				Median OR for EMS agency effect (95% CI)				Median OR for EMS agency effect (95% CI)		
Unadjusted	1.42 (1.30, 1.61)	1.52 (1.33, 1.83)	1.42 (1.32, 1.58)		1.27 (1.15, 1.50)	1.44 (1.26, 1.80)	1.34 (1.21, 1.59)		1.62 (1.41, 1.97)	1.45 (1.18, 2.28)	1.47 (1.34, 1.65)
Adjusted for patient demographics[1]	1.42 (1.29, 1.61)	1.57 (1.37, 1.91)	1.42 (1.31, 1.57)		1.31 (1.18, 1.55)	1.54 (1.33, 1.93)	1.35 (1.22, 1.60)		1.58 (1.37, 1.92)	1.39 (1.14, 2.31)	1.47 (1.34, 1.66)
Adjusted for patient demographics[1]and cardiac arrest event characteristics[2]	1.44 (1.30, 1.67)	1.63 (1.38, 2.10)	1.44 (1.33, 1.61)		1.35 (1.21, 1.62)	1.51 (1.30, 1.92)	1.39 (1.24, 1.66)		1.58 (1.37, 1.93)	1.42 (1.15, 2.39)	1.47 (1.35, 1.66)
Adjusted for patient demographics[1], cardiac arrest event characteristics[2], and layperson interventions[3]	1.42 (1.28, 1.65)	1.61 (1.37, 2.07)	1.43 (1.32, 1.59)		1.32 (1.19, 1.59)	1.37 (1.19, 1.78)	1.38 (1.23, 1.64)		1.58 (1.38, 1.94)	1.41 (1.14, 2.39)	1.47 (1.34, 1.65)
Adjusted for patient demographics[1], cardiac arrest event characteristics[2],	1.48 (1.34, 1.71)	1.42 (1.22, 1.85)	1.40 (1.29, 1.55)		1.37 (1.21, 1.68)	1.38 (1.19, 1.81)	1.40 (1.24, 1.68)		1.65 (1.44, 2.00)	1.41 (1.14, 2.38)	1.42 (1.30, 1.60)

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layperson interventions[3], and EMS interventions[4]											
Adjusted for patient demographics[1], cardiac arrest event characteristics[2], layperson interventions[3], EMS interventions[4], and EMS agency-level variables[5]	1.44 (1.30, 1.66)	1.45 (1.24, 1.91)	1.36 (1.27, 1.50)		1.32 (1.17, 1.65)	1.34 (1.15, 1.83)	1.34 (1.19, 1.62)		1.51 (1.32, 1.85)	*	1.39 (1.28, 1.55)

* Unable to estimate due to model overfitting

Abbreviation; OHCA, out-of-hospital cardiac arrest; EMS, emergency medical services; CI, confidence interval; CPR, cardiopulmonary resuscitation; AED, automated external defibrillator; BLS, basic life support; ALS, advanced life support

1. Patient age and sex

2. Year of arrest, initial rhythm, location of arrest, and witnessed collapse

3. Layperson CPR and public AED use

4. Number of treating EMS personnel within 15 minutes after 9-1-1 call, epinephrine administration, attempted advanced airway, chest compression fraction, chest compression rate, and chest compression depth

5. EMS crew composition characteristics, proportion of patients who received any resuscitation attempt among EMS-assessed OHCA, ALS/BLS tiered system, and area of EMS coverage.

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eTable 5. Variation in Survival and Functional Outcomes after EMS-treated Out-of-Hospital Cardiac Arrest between EMS Agencies, Primary agency=first arriving agency

	EMS-treated OHCA				EMS-treated shockable OHCA				EMS-treated non-shockable OHCA		
	Survival to hospital discharge	Favorable functional outcome	ROSC at ED arrival		Survival to hospital discharge	Favorable functional outcome	ROSC at ED arrival		Survival to hospital discharge	Favorable functional outcome	ROSC at ED arrival
	n=32,533	n=18,442	n=32,528		n=7,602	n=4,421	n=7,600		n=24,931	n=14,021	n=24,928
	Median OR for EMS agency effect (95% CI)				Median OR for EMS agency effect (95% CI)				Median OR for EMS agency effect (95% CI)		
Unadjusted	1.44 (1.34, 1.55)	1.54 (1.40, 1.73)	1.69 (1.56, 1.85)		1.39 (1.29, 1.53)	1.52 (1.37, 1.74)	1.66 (1.51, 1.85)		1.58 (1.43, 1.79)	1.63 (1.40, 2.02)	1.74 (1.59, 1.93)
Adjusted for patient demographics[1]	1.42 (1.33, 1.54)	1.56 (1.42, 1.76)	1.69 (1.56, 1.85)		1.41 (1.31, 1.55)	1.55 (1.40, 1.78)	1.68 (1.53, 1.88)		1.54 (1.40, 1.75)	1.62 (1.40, 2.02)	1.74 (1.59, 1.93)
Adjusted for patient demographics[1]and cardiac arrest event characteristics[2]	1.44 (1.34, 1.57)	1.59 (1.43, 1.83)	1.73 (1.59, 1.91)		1.44 (1.33, 1.60)	1.54 (1.38, 1.76)	1.70 (1.55, 1.92)		1.54 (1.39, 1.75)	1.63 (1.40, 2.06)	1.78 (1.62, 1.98)
Adjusted for patient demographics[1], cardiac arrest event characteristics[2], and layperson interventions[3]	1.42 (1.33, 1.55)	1.57 (1.41, 1.80)	1.72 (1.59, 1.90)		1.40 (1.30, 1.54)	1.49 (1.35, 1.71)	1.68 (1.52, 1.89)		1.54 (1.40, 1.75)	1.65 (1.41, 2.08)	1.78 (1.63, 1.98)
Adjusted for patient demographics[1], cardiac arrest event characteristics[2],	1.55 (1.42, 1.71)	1.57 (1.40, 1.84)	1.69 (1.56, 1.86)		1.51 (1.37, 1.71)	1.54 (1.36, 1.83)	1.72 (1.55, 1.96)		1.64 (1.47, 1.89)	1.51 (1.28, 1.98)	1.70 (1.56, 1.89)

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layperson interventions[3], and EMS interventions[4]											
Adjusted for patient demographics[1], cardiac arrest event characteristics[2], layperson interventions[3], EMS interventions[4], and EMS agency-level variables[5]	1.53 (1.41, 1.69)	1.49 (1.33, 1.74)	1.67 (1.54, 1.84)		1.49 (1.35, 1.69)	1.41 (1.25, 1.68)	1.71 (1.54, 1.95)		1.57 (1.41, 1.81)	1.42 (1.20, 1.92)	1.68 (1.54, 1.86)

Abbreviation; OHCA, out-of-hospital cardiac arrest; EMS, emergency medical services; CI, confidence interval; CPR, cardiopulmonary resuscitation; AED, automated external defibrillator; BLS, basic life support; ALS, advanced life support

1. Patient age and sex

2. Year of arrest, initial rhythm, location of arrest, and witnessed collapse

3. Layperson CPR and public AED use

4. Number of treating EMS personnel within 15 minutes after 9-1-1 call, EMS response time, epinephrine administration, attempted advanced airway, chest compression fraction, and chest compression rate

5. EMS crew composition characteristics, proportion of patients who received any resuscitation attempt among EMS-assessed OHCA, ALS/BLS tiered system, and area of EMS coverage

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eTable 6. Variation in Survival and Functional outcomes after EMS-treated Out-of-Hospital Cardiac Arrest between EMS Agencies, Primary agency=highest level agency

	EMS-treated OHCA			EMS-treated shockable OHCA			EMS-treated non-shockable OHCA		
	Survival to hospital discharge n=32,007	Favorable functional outcome n=18,113	ROSC at ED arrival n=32,002	Survival to hospital discharge n=7,502	Favorable functional outcome n=4,362	ROSC at ED arrival n=7,500	Survival to hospital discharge n=24,505	Favorable functional outcome n=13,751	ROSC at ED arrival n=24,502
	Median OR for EMS agency effect (95% CI)			Median OR for EMS agency effect (95% CI)			Median OR for EMS agency effect (95% CI)		
Unadjusted	1.41 (1.31, 1.54)	1.52 (1.37, 1.74)	1.51 (1.41, 1.65)	1.38 (1.28, 1.52)	1.46 (1.31, 1.68)	1.56 (1.43, 1.74)	1.51 (1.37, 1.72)	1.62 (1.38, 2.05)	1.52 (1.41, 1.66)
Adjusted for patient demographics[1]	1.40 (1.30, 1.53)	1.55 (1.39, 1.79)	1.52 (1.41, 1.66)	1.40 (1.30, 1.55)	1.52 (1.36, 1.77)	1.58 (1.44, 1.77)	1.49 (1.35, 1.69)	1.62 (1.38, 2.05)	1.52 (1.41, 1.67)
Adjusted for patient demographics[1]and cardiac arrest event characteristics[2]	1.39 (1.30, 1.52)	1.54 (1.37, 1.79)	1.54 (1.43, 1.69)	1.41 (1.30, 1.57)	1.50 (1.34, 1.74)	1.59 (1.45, 1.79)	1.49 (1.35, 1.69)	1.65 (1.39, 2.13)	1.56 (1.44, 1.72)
Adjusted for patient demographics[1], cardiac arrest event characteristics[2], and layperson interventions[3]	1.38 (1.29, 1.51)	1.51 (1.35, 1.76)	1.54 (1.43, 1.69)	1.38 (1.27, 1.52)	1.45 (1.31, 1.69)	1.57 (1.44, 1.76)	1.49 (1.35, 1.70)	1.67 (1.40, 2.15)	1.56 (1.44, 1.73)
Adjusted for patient demographics[1], cardiac arrest event characteristics[2],	1.46 (1.35, 1.63)	1.47 (1.31, 1.74)	1.50 (1.39, 1.64)	1.46 (1.33, 1.66)	1.46 (1.29, 1.73)	1.57 (1.43, 1.77)	1.57 (1.41, 1.81)	1.55 (1.31, 2.04)	1.52 (1.40, 1.67)

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layperson interventions[3], and EMS interventions[4]									
Adjusted for patient demographics[1], cardiac arrest event characteristics[2], layperson interventions[3], EMS interventions[4], and EMS agency-level variables[5]	1.44 (1.33, 1.59)	1.33 (1.20, 1.56)	1.49 (1.39, 1.63)	1.43 (1.31, 1.62)	1.27 (1.15, 1.52)	1.53 (1.39, 1.73)	1.53 (1.38, 1.75)	1.41 (1.19, 1.98)	1.49 (1.39, 1.64)

Abbreviation; OHCA, out-of-hospital cardiac arrest; EMS, emergency medical services; CI, confidence interval; CPR, cardiopulmonary resuscitation; AED, automated external defibrillator; BLS, basic life support; ALS, advanced life support

1. Patient age and sex

2. Year of arrest, initial rhythm, location of arrest, and witnessed collapse

3. Layperson CPR and public AED use

4. Number of treating EMS personnel within 15 minutes after 9-1-1 call, EMS response time, epinephrine administration, attempted advanced airway, chest compression fraction, and chest compression rate

5. EMS crew composition characteristics, proportion of patients who received any resuscitation attempt among EMS-assessed OHCA, ALS/BLS tiered system, and area of EMS coverage.

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